



# ***New York State Testing Program***

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## **Educator Guide to the 2013 Grade 4 Common Core Mathematics Test**

**engage<sup>ny</sup>**

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## 2013 Common Core Mathematics Tests

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As part of the New York State Board of Regents Reform Agenda, the New York State Education Department (NYSED) has embarked on a comprehensive reform initiative to ensure that schools prepare students with the knowledge and skills they need to succeed in college and in their careers. To realize the goals of this initiative, changes have occurred in standards, curricula, and assessments. These changes will impact pedagogy and, ultimately, student learning.

The Common Core Learning Standards (CCLS) call for changes in what is expected from a teacher's instructional approach. In mathematics courses, the CCLS demand that teachers focus their instruction on fewer, more central standards (<http://engageny.org/resource/math-content-emphases/>), thereby providing room to build core understandings and connections between mathematical concepts and skills.

More specifically, the CCLS demand six key shifts in instruction in mathematics, summarized in the chart below. A more detailed description of these shifts can be found at <http://engageny.org/resource/common-core-shifts/>.

Shifts in Mathematics		
Shift 1	Focus	Teachers significantly narrow and deepen the scope of how time and energy is spent in the math classroom. They do so in order to focus deeply on only the concepts that are prioritized in the standards.
Shift 2	Coherence	Principals and teachers carefully connect the learning within and across grades so that students can add new understanding onto foundations built in previous years.
Shift 3	Fluency	Students are expected to have speed and accuracy with simple calculations; teachers structure class time and/or homework time for students to memorize core functions.
Shift 4	Deep Understanding	Students deeply understand and can operate easily within a math concept before moving on. They learn more than the procedure to get the answer right. They learn the math.
Shift 5	Application	Students are expected to use math and choose the appropriate concept for application even when they are not prompted to do so.
Shift 6	Dual Intensity	Students are practicing procedures and understanding concepts. There is more than a balance between these two things in the classroom—both are occurring with intensity.

The Grades 3–8 English Language Arts and Mathematics New York State Testing Program (NYSTP) has been redesigned to measure student learning aligned with the instructional shifts necessitated by the CCLS. This document provides specific details about the 2013 Grade 4 Common Core Mathematics Test and the standards that it measures.

## Common Core Learning Standards for Mathematics

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In Grade 4, the CCLS focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; and (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

1. Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations (in particular the distributive property) as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers, understand and explain why the procedures work based on place value and properties of operations, and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.
2. Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g.,  $15/9 = 5/3$ ), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.
3. Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

All the content at this grade level are connected to the Standards for Mathematical Practices. The 2013 Grade 4 Common Core Mathematics Test will include questions that require students to connect mathematical content and mathematical practices.

**For more information about the CCLS and Standards for Mathematical Practice, please refer to <http://engageny.org/resource/new-york-state-p-12-common-core-learning-standards-for-mathematics/>.**

## Clusters, Standards, and Sequencing in Instruction and Assessment

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The 2013 Grade 4 Common Core Mathematics Test will focus entirely on the Grade 4 New York State CCLS for Mathematics. As such, the test will be designed differently than in the past.

The CCLS for Mathematics are divided into *standards*, *clusters*, and *domains*.

- *Standards* define what students should understand and be able to do. In some cases, standards are further articulated into lettered *components*.
- *Clusters* are groups of related *standards*. Note that *standards* from different *clusters* may sometimes be closely related, because mathematics is a connected subject.
- *Domains* are larger groups of related *clusters* and *standards*. Standards from different domains may be closely related.

### Content Emphases

The CCLS for Mathematics were designed with the understanding that not all clusters should be emphasized equally in instruction or assessment. Some clusters require greater emphasis than the others based on the time that they take to master and/or their importance to future mathematics or the demands of college and career readiness. The Grade 4 CCLS are divided into *Major Clusters*, *Supporting Clusters*, and *Additional Clusters*. The *Major Clusters* are the intended instructional focus at Grade 4 and will account for the majority of math test questions. The *Supporting Clusters* and *Additional Clusters* are Mathematics Standards that serve to both introduce and reinforce Major Clusters. The chart below details the recommended instructional focus and the percentage of test questions that assess the Major, Supporting, and Additional Clusters:

**Cluster Emphases for Instruction and the 2013 Grade 4 Common Core Mathematics Test**

Cluster Emphasis	Recommended Instructional Time	Approximate Number of Test Points
<b>Major</b>	65–75%	70–80%
<b>Supporting</b>	15–25%	10–20%
<b>Additional</b>	5–15%	5–10%

### Emphasized Standards

The CCLS for Mathematics were also designed with the understanding teachers would emphasize standards that best facilitate mastery of the most important grade-level mathematics and best position students for mastery of future mathematics. Similar to the cluster emphases, not all standards should receive similar emphasis. Within each of the clusters and domains, certain standards require more instructional and assessment emphasis.

One example of a standard needing greater emphasis is 4.NF.3, “Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ ”, which hinges on students’ understanding of 4.NF.1, “Explain why a fraction  $a/b$  is equivalent to a fraction  $(n \times a)/(n \times b)$  by using visual fraction models...” and 4.NF.2, “Compare two fractions with different numerators and different denominators.” Standards 4.NF.1 and 4.NF.2 build

understandings that, at the cluster level, “[e]xtend understanding of fraction equivalence and ordering.” It is this understanding of fraction equivalence and ordering that enables students to synthesize knowledge from 4.NF.1 and 4.NF.2, thus assuring their ability to “[b]uild fractions from unit fractions by applying and extending previous understandings of operations on whole numbers” at the cluster level for 4.NF.3. Ultimately, 4.NF.1 and 4.NF.2 serve as foundational conceptual understandings that are necessary in order to reach the application of those understandings to apply the operations on fractions, as required by 4.NF.3.

An emphasis on the most critical clusters and standards allows depth and focus in learning, which is carried out through the Standards for Mathematical Practice. Without such depth and focus, attention to the Standards for Mathematical Practice would be unrealistic.

**For more information about the Content Emphases, please refer to**  
<http://engageny.org/resource/math-content-emphases/>.

## Sequencing

The August 2012 memorandum *Grades 3–8 Mathematics Testing Program Guidance: September-to-April / May-to-June Common Core Learning Standards* provides guidance on aligning standards to each time period. Standards designated as September-to-April will be assessed on the 2013 Grade 4 Common Core Mathematics Test. Several standards designated as Major Clusters are included in the *May-to-June* instructional period. Placing these standards in the May-to-June instructional period provides more coherent September-to-April content blocks and allows for more logical sequencing for standards that closely relate to the Major Clusters of the following year. Starting with the April 2013 administration, most test questions will target more than one standard. Some questions will assess an entire cluster. As such, many individual test questions will assess Grade 4 September-to-April standards in conjunction with standards from past grades.

One of the ways the CCLS are changing instructional practices and our assessment design is through the spiraling of mathematic concepts within and across grade levels. This means that when a student has mastered a particular standard, that student has also inherently mastered the related standards that came before. It is our recommendation, therefore, that all teachers pay close attention to student mastery of *May-to-June* standards so that student learning can begin promptly and efficiently the following year.

**For more information about the *Grades 3–8 Mathematics Testing Program Guidance: September-to-April / May-to-June Common Core Learning Standards*, please refer to**  
<http://www.p12.nysed.gov/assessment/math/math-ei.html>.

## Emphases and Sequencing

The chart below illustrates the different *clusters* and *standards* recommended for instructional emphasis. *Standards* that are recommended for greater emphasis are indicated with a check mark while those that are recommended for instruction after the administration of the 2013 Grade 4 Common Core Mathematics Test are indicated by the word “Post.” ***The instructional emphasis recommended in the chart below is mirrored in the Grade 4 test design, whereby clusters and standards that are recommended for greater emphasis will be assessed in greater number. Standards recommended for greater emphasis that are***

designated for instruction after the administration of the 2013 Grade 4 Common Core Mathematics Test, while not tested, will be fundamental in ensuring that students are prepared for Grade 5 instruction.

Cluster Emphasis	Domain	Cluster	Standard		
Major Clusters	Operations and Algebraic Thinking	<i>Use the four operations with whole numbers to solve problems.</i>	4.OA.1		
			4.OA.2	✓	
			4.OA.3		
	Number and Operations in Base Ten	<i>Generalize place value understanding for multi-digit whole numbers.</i>	4.NBT.1		
			4.NBT.2		
			4.NBT.3		
		<i>Use place value understanding and properties of operations to perform multi-digit arithmetic.</i>	4.NBT.4		
			4.NBT.5	✓	
			4.NBT.6		
	Number and Operations – Fractions	<i>Extend understanding of fraction equivalence and ordering.</i>	4.NF.1		
			4.NF.2		
		<i>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</i>	4.NF.3	✓	
			4.NF.4	✓	
		<i>Understand decimal notation for fractions, and compare decimal fractions.</i>	4.NF.5		Post
			4.NF.6	✓	Post
			4.NF.7	✓	Post
Supporting Clusters	Operations and Algebraic Thinking	<i>Gain familiarity with factors and multiples.</i>	4.OA.4		
	Measurement and Data	<i>Solve problems involving measurements and conversion of measurements from a larger unit to a smaller unit.</i>	4.MD.1		Post
			4.MD.2		Post
			4.MD.3		
		<i>Represent and interpret data.</i>	4.MD.4		
Additional Clusters	Operations and Algebraic Thinking	<i>Generate and analyze patterns.</i>	4.OA.5		
	Measurement and Data	<i>Geometric measurement: understand concepts of angles and measure angles.</i>	4.MD.5		
			4.MD.6		
			4.MD.7		
	Geometry	<i>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</i>	4.G.1		
			4.G.2		
			4.G.3		

✓ = Standards recommended for greater emphasis

Post = Standards recommended for instruction in May-June



# The 2013 Grade 4 Common Core Mathematics Test

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## Testing Sessions and Times

The 2013 Grade 4 Common Core Mathematics Test will consist of **three books** that are administered over **three successive days**, one book per day. The 2013 Grade 4 Common Core Mathematics Test is designed so that most students will complete Book 1 and Book 2 in approximately 50 minutes each and Book 3 in about 70 minutes. While it is likely that most students will complete each book sooner, students are permitted 70 minutes to complete Book 1, 70 minutes to complete Book 2, and 90 minutes to complete Book 3. This design provides ample time for students who work at different paces. For more information regarding what students may do once they have completed their work, please refer to the section, “When Students Have Completed Their Tests.”

**Grade 4 Estimated Time on Task**

<b>Book</b>	<b>Day Administered</b>	<b>Estimated Time on Task</b>
1	1	50*
2	2	50*
3	3	70**
Total Estimated Time		170

\* Day 1 and Day 2 will be scheduled to allow 70 minutes for completion.

\*\* Day 3 will be scheduled to allow 90 minutes for completion.

The tests must be administered under standard conditions and the directions must be followed carefully. The same test administration procedures must be used with all students so that valid inferences can be drawn from the test results.

NYSED devotes great attention to the security and integrity of the NYSTP. School administrators and teachers involved in the administration of State Assessments are responsible for understanding and adhering to the instructions set forth in the *2013 School Administrator’s Manual* and the *Teacher’s Directions*. These resources will be posted at

<http://www.p12.nysed.gov/assessment/ei/eigen.html>.

## When Students Have Completed Their Tests

Students who finish their assessment before the allotted time expires should be encouraged to go back and check their work. Once the student checks his or her work, or chooses not to, examination materials should be collected by the proctor. After a student's assessment materials are collected, that student may be permitted to read silently.\* This privilege is granted at the discretion of each school. No talking is permitted and no other schoolwork is permitted.

\*For more detailed information about test administration, including proper procedures for talking to students during testing and handling reading materials, please refer to the *2013 School Administrator's Manual* and the *Teacher's Directions*.

## Test Design

In Grade 4, students are required to apply mathematical understandings and mathematical practices gained in the classroom in order to answer three types of questions: multiple-choice, short-response, and extended-response. Book 1 and Book 2 will consist of multiple-choice questions. Book 3 consists of short- and extended-response questions.

The chart below provides a description of the 2013 Grade 4 Test Design. Please note that the number of multiple-choice questions in Book 1 and in Book 2 includes embedded field test questions. It will not be apparent to students whether a question is an embedded field test question that does not count towards their score or an operational test question that does count towards their score.

**Grade 4 Test Design**

<b>Book</b>	<b>Number of Multiple-Choice Questions</b>	<b>Number of Short-Response Questions</b>	<b>Number of Extended-Response Questions</b>	<b>Total Number of Questions</b>
1	30	0	0	32
2	32	0	0	30
3	0	6	4	10
<b>Total</b>	62	6	4	72

## 2013 Grade 4 Common Core Mathematics Test Blueprint

All questions on the 2013 Grade 4 Common Core Mathematics Test measure the CCLS for Mathematics. The test was designed around the Content Emphases (page 3). As such, questions that assess the Major Clusters make up the majority of the test. Additionally, standards recommended for more emphasis within clusters (page 5) are assessed with greater frequency.

While all questions are linked to a primary standard, many questions measure more than one standard and one or more of the Standards for Mathematical Practices. Similarly, some questions measure cluster-level understandings. As a result of the alignment to standards, clusters, and the Standards for Mathematical Practice, the tests assess students' conceptual understanding, procedural fluency, and problem-solving abilities, rather than assessing their knowledge of isolated skills and facts.

The charts below illustrate the domain-level and cluster-level test blueprint. For more information on which clusters and standards to emphasize in instruction, please refer to page 5.

Domain-Level Test Blueprint—Percent of Test Points on Grade 4 Test				
Number and Operations in Base Tens	Number and Operations-Fractions	Operations and Algebraic Thinking	Measurement and Data	Geometry
20–30%	20–30%	15–25%	15–25%	5–15%

Cluster-Emphasis Test Blueprint—Percent of Test Points on Grade 4 Test		
Major Clusters	Supporting Clusters	Additional Clusters
70–80%	10–20%	5–10%

## **Question Formats**

The 2013 Grade 4 Common Core Mathematics Test contains multiple-choice, short-response (2-Point), and extended-response (3-Point) questions. For multiple-choice questions, students select the correct response from four answer choices. For short- and extended-response questions, students write an answer to an open-ended question and may be required to show their work. In some cases, they may be required to explain, in words, how they arrived at their answers.

### **Multiple-Choice Questions**

Multiple-choice questions are designed to assess CCLS for Mathematics. Mathematics multiple-choice questions will mainly be used to assess standard algorithms and conceptual standards. Multiple-choice questions incorporate both Standards and Standards for Mathematical Practices, some in real-world applications. Many multiple-choice questions require students to complete multiple steps. Likewise, many of these questions are linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts. Within answer choices, distractors<sup>1</sup> will all be based on plausible missteps.

### **Short-Response Questions**

Short-response questions are similar to past 2-Point questions, requiring students to complete a task and show their work. Like multiple-choice questions, short-response questions will often require multiple steps, the application of multiple mathematics skills, and real-world applications. Many of the short-response questions will cover conceptual and application standards.

### **Extended-Response Questions**

Extended-response questions are similar to past 3-Point questions, asking students to show their work in completing two or more tasks or one more extensive problem. Extended-response questions allow students to show their understanding of mathematical procedures, conceptual understanding, and application. Extended-response questions may also assess student reasoning and the ability to critique the arguments of others.

## **Sample Questions**

**Sample Questions for the Grade 4 Common Core Mathematics Tests are available at**  
<http://www.p12.nysed.gov/assessment/common-core-sample-questions/>.

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<sup>1</sup> A distractor is an incorrect response that may appear to be a plausible correct response to a student who has not mastered the skill or concept being tested.

## New Mathematics Rubrics and Scoring Policies

The 2013 Grade 4 Common Core Mathematics Test will use new rubrics and scoring policies. Both the Mathematics 2-point and 3-point Rubrics have changed to reflect the new demands called for by the CCLS. Similarly, new scoring policies have been adopted to address CCLS Mathematics Standards. The new Mathematics rubrics are as follows:

### 2-Point Holistic Rubric

<b>2 Points</b>	<p>A 2-point response answers the question correctly.</p> <p>This response</p> <ul style="list-style-type: none"><li>• demonstrates a thorough understanding of the mathematical concepts, but may contain errors that do not detract from the demonstration of understanding</li><li>• indicates that the student has completed the task correctly using mathematically sound procedures</li></ul>
<b>1 Point</b>	<p>A 1-point response is only partially correct.</p> <p>This response</p> <ul style="list-style-type: none"><li>• indicates that the student has demonstrated only a partial understanding of the mathematical concepts and/or procedures in the task</li><li>• correctly addresses some elements of the task</li><li>• may contain an incorrect solution but applies a mathematically appropriate process</li><li>• may contain correct numerical answer(s) but required work is not provided</li></ul>
<b>0 Points</b>	<p>A 0-point response is incorrect, irrelevant, incoherent, or contains a correct response arrived at using an obviously incorrect procedure. Although some parts may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.</p>

### 2-Point Scoring Policies

- Scoring Policies provided for past New York State Tests will **NOT** apply to the 2013 Common Core Mathematics Tests.
- New Scoring Policies are provided on page 12.

### 3-Point Holistic Rubric

<b>3 Points</b>	<p>A 3-point response answers the question correctly.</p> <p>This response</p> <ul style="list-style-type: none"> <li>demonstrates a thorough understanding of the mathematical concepts but may contain errors that do not detract from the demonstration of understanding</li> <li>indicates that the student has completed the task correctly, using mathematically sound procedures</li> </ul>
<b>2 Points</b>	<p>A 2-point response is partially correct.</p> <p>This response</p> <ul style="list-style-type: none"> <li>demonstrates partial understanding of the mathematical concepts and/or procedures embodied in the task</li> <li>addresses most aspects of the task, using mathematically sound procedures</li> <li>may contain an incorrect solution but provides complete procedures, reasoning, and/or explanations</li> <li>may reflect some misunderstanding of the underlying mathematical concepts and/or procedures</li> </ul>
<b>1 Point</b>	<p>A 1-point response is incomplete and exhibits many flaws but is not completely incorrect.</p> <p>This response</p> <ul style="list-style-type: none"> <li>demonstrates only a limited understanding of the mathematical concepts and/or procedures embodied in the task</li> <li>may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete</li> <li>exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning</li> <li>reflects a lack of essential understanding of the underlying mathematical concepts</li> <li>may contain correct numerical answer(s) but required work is not provided</li> </ul>
<b>0 Points</b>	<p>A 0-point response is incorrect, irrelevant, incoherent, or contains a correct response arrived at using an obviously incorrect procedure. Although some parts may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.</p>

### 3-Point Scoring Policies

- Scoring Policies provided for past New York State Tests will **NOT** apply to the 2013 Common Core Mathematics Tests.
- New Scoring Policies are provided on the next page.

## 2013 2- and 3-Point Mathematics Scoring Policies

Below are the policies to be followed while scoring the mathematics tests for all grades:

1. If a student does the work in other than a designated “Show your work” area, that work should still be scored. (Additional paper is an allowable accommodation for a student with disabilities if indicated on the student’s Individual Education Program or Section 504 Accommodation Plan.)
2. If the question requires students to show their work, and the student shows appropriate work and clearly identifies a correct answer but fails to write that answer in the answer blank, the student should still receive full credit.
3. If the question requires students to show their work, and the student shows appropriate work and arrives at the correct answer but writes an incorrect answer in the answer blank, the student should **not** receive full credit.
4. In questions that provide ruled lines for students to write an explanation of their work, mathematical work shown elsewhere on the page should be considered and scored.
5. If the student provides one legible response (and one response only), teachers should score the response, even if it has been crossed out.
6. If the student has written more than one response but has crossed some out, teachers should score only the response that has **not** been crossed out.
7. Trial-and-error responses are **not** subject to Scoring Policy #6 above, since crossing out is part of the trial-and-error process.
8. If a response shows repeated occurrences of the same conceptual error within a question, the student should **not** be penalized more than once.
9. In questions that require students to provide bar graphs,
  - in Grades 3 and 4 only, touching bars are acceptable
  - in Grades 3 and 4 only, space between bars does **not** need to be uniform
  - in all grades, widths of the bars must be consistent
  - in all grades, bars must be aligned with their labels
  - in all grades, scales must begin at 0, but the 0 does **not** need to be written
10. In questions requiring number sentences, the number sentences must be written horizontally.
11. In pictographs, the student is permitted to use a symbol other than the one in the key, provided that the symbol is used consistently in the pictograph; the student does not need to change the symbol in the key. The student may **not**, however, use multiple symbols within the chart, nor may the student change the value of the symbol in the key.
12. If students are not directed to show work, any work shown will not be scored. This applies to items that do not ask for any work and items that ask for work for one part and do not ask for work in another part.

## **Mathematics Tools**

### **Why Mathematics Tools?**

These provisions are necessary for students to meet Standard for Mathematical Practice Five found throughout the New York State P–12 Common Core Learning Standards for Mathematics:

#### **Use appropriate tools strategically**

*Mathematically proficient students consider the available tools when solving a mathematical problem. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.*

### **Rulers and Protractors**

Students in Grade 4 must have a ruler and a protractor for their exclusive use for all sessions of the test. Students with disabilities may use adapted rulers and protractors if this is indicated as a testing accommodation on the student's Individualized Education Program or Section 504 Accommodation Plan.

Note: Schools are responsible for supplying the appropriate tools for use with the Grade 4 Mathematics Test. NYSED does not provide them.

### **Calculators**

Students in Grade 4 are **NOT** permitted to use calculators for the 2013 Grade 4 Common Core Mathematics Test.